With Reference to: Petition for Rulemaking of NextNav Inc., ECFS INBOX-1.401 and Supplementary Filings.

RAIN RFID (also known as passive UHF RFID) is a crucial technology that enhances the resilience and efficiency of America’s supply chains. As described in the Executive Order on Resilient Supply Chains of June 2024, the United States needs resilient, diverse, and secure supply chains to ensure our economic prosperity, public health, and national security.[1] Resilient supply chains include greater domestic production; a diverse and agile supplier base; a reliable transportation system; secure critical infrastructure; adequate stockpiles; reliable food systems; and a world-class, globally competitive American manufacturing base.

Over 200 billion RAIN RFID tag chips have shipped to date, with approximately 40% of those deployed in the US. As an “internet of things” this means 80 billion items have been tagged with RAIN RFID in the US, and the data from these tags has served to increase supply chain resilience through digital transformation in sectors including retail, logistics, healthcare, pharmaceuticals, automotive, aviation, smart manufacturing, food safety, energy, smart cities and others. **FCC specifically allowed RAIN RFID operation in the ISM band and the industry relied on that policy and has tagged this billions of RAIN RFID tags into primarily Fortune 500 enterprises based on that policy.**[2]

The RAIN RFID industry is widely deployed in many critical applications across a broad range of industries (see Background Information). RAIN RFID affects industries and systems that in turn affect every aspect of Americans’ daily lives such as: power generation - including nuclear power plants, healthcare, transportation, retail, food supply, and logistics. Disruption to any of these would result in significant negative socio-economic outcomes.

If the NextNav Inc. Petition for Rulemaking is awarded, this will have profound negative impacts on RAIN RFID operations in the USA, destroying supply chain resilience. This Petition would likely result in RAIN RFID being unreliable and inaccurate at best, leading to major losses and abandonment of RAIN RFID across entire industries. **It is not an exaggeration to say that the rule changes requested by NextNav Inc. have the potential to render RAIN RFID an unusable technology.**

The Impact on PolyGAIT as a Result of Awarding the NextNav Petition

The California Polytechnic State University (San Luis Obispo) Center for Global Automatic Identification Technologies (PolyGAIT) provides education and training, innovative research and development, and process improvement solutions in the areas of radio-frequency identification (RFID), real-time location systems (RTLS), and internet of things (IoT).

PolyGAIT (https://polygait.calpoly.edu/) was initiated in 2003 with donations and sponsored projects from California Polytechnic State University alumni whose companies needed RFID solutions. The PolyGAIT Multidisciplinary R&D Laboratory was established in 2004, and declared a University Center in 2008. Twenty years later, PolyGAIT is one of the largest RFID research and development labs in the US with over 400 projects completed and over 1350 alumni and current students involved in RFID and IoT courses & projects.

PolyGAIT has been at the forefront of several radio frequency-based fast-growing technologies, including: Radio Frequency Identification (RFID), Real Time Location Systems (RTLS), Long Range Wide Area Networks (LoRaWAN), and Near Field Communication (NFC).

The center collaborates with industrial, governmental, and nonprofit organizations on training and development of prototype systems for process improvement. In the last decade PolyGAIT has been developing capabilities in additional important technological areas, mainly Unmanned Aerial Vehicles (UAV), Industrial Internet of Things (IIoT), and Inference Technologies, such as Artificial Intelligence (AI), Machine Learning (ML) and various types of simulation modeling.

If the NextNav Inc. Petition for Rulemaking is awarded, PolyGAIT will have to drastically reduce or eliminate its collaborations with government and industry partners. PolyGAIT would be able to offer only a limited scope of research and development projects and might have to cease operations entirely.

Request to Reject the NextNav Petition for Rulemaking

We respectfully request that the NextNav Petition for Rulemaking be rejected due to the extensive negative impacts on RAIN RFID deployments and on supply chain resilience across multiple sectors and the detrimental effect on many entities, including the California Polytechnic State University (San Luis Obispo) Center for Global Automatic Identification Technologies (PolyGAIT).

Background Information: RAIN RFID Benefits Which Would be Destroyed by the NextNav Petition

Retail:

Approximately 50% of RAIN RFID tags are deployed in retail, equating to >40B tagged items in the US alone to date. This sector is projected to grow at over 19% CAGR. Retail deployments maximize profitability and minimize costs in a segment which, as of the first quarter of 2024, accounted for approximately 6.3% of the U.S. GDP by using RAIN RFID to:

- Enable “real time” accurate inventory & greater control over stock
- Increase productivity of the workforce by streamlining the inventory process
- Enable digital commerce business models
- Improve profitability by ensuring every item is sold
- Accurately manage the supply chain

- Detect and Prevent Losses
- Provide anti-counterfeit and returns-fraud solutions (NRF estimates that returns-fraud represents 1.6% of total sales, which amounts to approximately USD $85 billion annually[3]
- Automate checkout and provide frictionless payments
- Comply with the Food Safety Modernization Act for food traceability and supply-chain record keeping, including preventing shortages and stockouts, reducing waste and spoilage, increasing sustainability and improving transparency among trading partners.

Logistics:

3.4B RAIN RFID tag units were deployed globally in Logistics in 2023. This is projected to grow at a CAGR of 32%.

As of 2024, the total U.S. business logistics costs are estimated to be $2.3 trillion, which translates to about 8.7% of the national GDP.[4,5] This sector includes transportation, warehousing, and inventory management, playing a critical role in supporting the economy by ensuring efficient movement and storage of goods. The logistics industry's impact on GDP underscores its importance in facilitating trade and commerce, ultimately driving economic growth.

The RAIN RFID benefits accruing to the Logistics sector include:

- Route optimization to increase efficiency
- Improving warehouse storage utilization capacity and reducing dwell time in logistics environments
- Real time inventory across the entire supply chain
- Reduction of lost items
- “right first time” delivery
- Automating manual scanning (UPS, for example, is transitioning to a RAIN RFID-enabled “sensing” network as it looks to eliminate 130 million daily “scans”)[6]
- Proof of correct delivery
- Improved customer engagement and satisfaction
- Reducing logistics organization’s carbon footprints
- Condition-based monitoring (e.g. temperature monitoring)

Baggage Handling:

The IATA resolution 743 supporting RAIN RFID tagging of baggage is not a mandate, but it is nonetheless driving increased tracking events using IATA RP1740c.[7] For many airlines, their RAIN RFID investments are closely tied to their customer engagement and satisfaction objectives, providing them with more customized travel experiences.

Tire Tagging:

The tire tagging industry is evolving to embedded RAIN RFID solutions to support a broader scope of applications, including supporting circular economy and sustainability requirements. Key factors driving tire tagging efforts include:

- enabling automatic proof of delivery, improving operational efficiencies, facilitating sorting of tires by age and supporting item level traceability
- supporting re-treading which results in 3 times overall resource efficiency and 4 times fewer tires - with each retreaded tire saving 30kg rubber, 20kg steel and 60kg CO_2.[8]

Healthcare:

Beds, surgical instruments, drugs, patients, mobile medical devices, etc., all can be tagged and tracked using RAIN RFID. Which means that RAIN RFID technology helps enable hundreds of healthcare applications - improving patient safety, managing surgical instruments, supporting staff and patient workflow, automating replenishment and billing, authenticating quality and sterilization processes, managing medical equipment location and automating supply chain management.

According to Harvard Business Review, hospitals in the US spent an average of **$11.9 million each on medical and surgical supplies** in 2018, accounting for up to one-third of total operating expenses at some.[9]

Tagging pharmaceutical items with RFID, for example, enables automating the inventory tracking and ordering of the items which can significantly reduce the management and waste-related costs for hospital pharmaceuticals. “Transforming the supply chain digitally can lead up to a **50% reduction** in process costs and an **increase in revenue by 20%**.” [10]

The Pharmaceutical industry also uses RAIN RFID to track drugs from manufacturing to distribution, ensuring that medications are properly handled and stored. Hospitals may have thousands of medications tagged with RAIN RFID. In 2023 over 600 hospitals in the US employed approximately 50 million RAIN RFID tags to manage anesthesia medication.[11]

Another application for RAIN RFID is to optimize workflows by gaining visibility into how equipment, patients, and materials flow in the day-to-day operation of a hospital. The Mayo Clinic’s Saint Mary’s Hospital in Rochester, Minnesota, uses RFID technology to reduce the time that staff members spend finding equipment and each other, allowing them to spend more time on patient care.[12]

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[1] https://www.whitehouse.gov/briefing-room/statements-releases/2024/06/14/executive-order-on-white-house-council-onsupply-chain-resilience/

[2] https://transition.fcc.gov/oet/ea/presentations/files/may05/New_Policies_Pt._15_SD.pdf

[3] https://www.ecrloss.com/blog/understanding-returns-fraud

[4] https://cscmp.org/CSCMP/CSCMP/Educate/State_of_Logistics_Report.aspx

[5] https://www.kearney.com/service/operations-performance/state-of-logistics-report

[6] https://rainrfid.org/rain-rfid-2024-market-report/

[7] https://www.iata.org/contentassets/e7a533819be440edbb1e49da96e0f2a8/guidance-document-interlineirops_25june2020.pdf

[8] https://btmauk.com/retreading/

[9] https://hbr.org/2022/01/how-digital-transformation-can-improve-hospitals-operational-decisions#:~:text=In%20the%20United%20States%2C%20hospitals,total%20operating%20expenses%20at%20some

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[11] https://www.specialtypharmacycontinuum.com/Pharmacy-Technology-Report/Article/09-23/RFID-Tags-Reduce-Restocking-Errors-Of-Anesthesia-Medications/71320

[12] https://hbr.org/2015/12/how-rfid-technology-improves-hospital-care